Notice of Allowability	Application No.	Applicant(s)	
	10/779,717	TORII ET AL.	
	Examiner	Art Unit	
	Peter Coughlan	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *5/31/2007*.

2. ☒ The allowed claim(s) is/are *1-4,11-16 and 20-29*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Examiner's Amendments / Reasons For allowance

1. Claims 1-4, 11-16, 20-29 are allowed.

2. The following is an Examiner's Statement for reasons for allowance:

The cited art alone or in combination fails to teach the claimed invention of A first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a feedback loop of an output of at least one node, and outputting a vehicle parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model plural second recurrent neural networks, each of said second recurrent neural networks formed by connecting second plural nodes such that a second output of a second node is input to another second node in accordance with a second predetermined coupling weight coefficient, comprising a second feedback loop of a second output of at least one second node, and outputting a second vehicle parameter different from said vehicle parameter output from said first recurrent neural network and indicating said motion state of the vehicle based on said predetermined input information, thereby functioning as said vehicle motion model an optimizing unit for determined an optimum solution of said predetermined coupling weight coefficient of said first recurrent neural network and said second predetermined coupling weight coefficient of said plural second recurrent neural networks based on learning rule using a

hereditary algorithm wherein said first recurrent neural network and said plural second recurrent neural networks are mutually connected to each other such that a state variable including a correlation with said vehicle parameter output from said first recurrent neural network is input to each of said plural second recurrent neural networks.

3. The closest prior art teaches (U. S. Patent 6092018, referred to as **Puskorius**) a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a feedback loop of an output of at least one node, and outputting a vehicle parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model (**Puskorius,** Fig. 3, C2:31-34, abstract; 'First recurrent neural network' of applicant is equivalent to nodes 111-115 in Fig. 3 of Puskorius. 'Feedback loop' of applicant is illustrated by the 5 connections leading into nodes 131-135 of Puskorius. 'Vehicle parameter indicating a motion state' of applicant is equivalent to 'engine control' of Puskorius.); plural second recurrent neural networks, each of said second recurrent neural networks formed by connecting second plural nodes such that a second output of a second node is input to another second node in accordance with a second predetermined coupling weight coefficient, comprising a second feedback loop of a second output of at least one second node, and outputting a second vehicle parameter

different from said vehicle parameter output from said first recurrent neural network and indicating said motion state of the vehicle based on said predetermined input information, thereby functioning as said vehicle motion model. (**Puskorius,** Fig. 3, C2:31-34, abstract; 'Second recurrent neural network' of applicant is illustrated by nodes 116 and 117 of Puskorius. 'Second feedback loop' of applicant is illustrated by the connections from nodes 116 and 117 back into the input locations which are supplied from the first neural network. 'Vehicle parameter indicating a motion state' of applicant is equivalent to 'engine control' of Puskorius.) Wherein said first recurrent neural network and said plural second recurrent neural networks are mutually connected to each other such that a state variable including a correlation with said vehicle parameter output from said first recurrent neural network is input to each of said plural second recurrent neural networks. (**Puskorius,** Fig. 3, Nodes 111-115 are connected to nodes 116 and 117. Applicant should note that a characteristic of 'recurrent neural networks' is that they allow the output of the recurrent neural network to be connected anywhere, including feedback to earlier recurrent neural networks or itself. This means that recurrent neural networks can be stacked any way desired.)

Complementary art teaches (U. S. Patent 6042548, referred to as **Giuffre**) an optimizing unit for determined an optimum solution of said predetermined coupling weight coefficient of said first recurrent neural network and said second predetermined coupling weight coefficient of said plural second recurrent neural networks based on learning rule using a hereditary algorithm. (**Giuffre,** C4:39-60)

4. The references either by themselves or in combination fail to teach vehicle motion model generating device which indicates a motion state of a vehicle which is composed of a network of recurrent neural networks. One of the outputs of the 'first recurrent neural network' is used as a feedback for the 'remaining recurrent neural networks' and all of the recurrent neural networks are optimized by a hereditary algorithm.

5. The references either by themselves or in combination fail to teach a network of recurrent neural networks each of which produces a separate vehicle motion characteristic and the results of the 'first vehicle motion characteristic' is used as feedback to the remaining recurrent neural networks each of which produces a different vehicle motion characteristic from the remaining neural networks. Fig. 2 of applicant discloses six inputs for the invention. These inputs are 'steering angle', 'steering angular velocity', 'steering angle acceleration', 'steering reaction force', 'vehicle speed' and 'vehicle acceleration.' Four recurrent neural networks are disclosed with the 'first recurrent neural network' being labeled as 'yaw rate.' The remaining recurrent neural networks which use an output of the 'yaw rate' recurrent neural network are 'lateral g', 'roll' and 'pitch.' The outputs of the invention are 'yaw rate', 'lateral g', 'roll' and 'pitch.'

Any comments considering necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "comments on Statement of Reasons for Allowance."

6. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Peter Coughlan whose telephone number is (571) 272-5990, Monday through Friday from 7:15 a.m. to 3:45 p.m. or contact the Supervisor Mr. David Vincent at (571) 272-3080.

Peter Coughlan

Patent Examiner

7/17/2007

7/18/07
DAVID VINCENT
SUPERVISORY PATENT EXAMINER